

**DEPARTMENT OF WATER RESOURCES**

1416 NINTH STREET, P.O. BOX 942836  
SACRAMENTO, CA 942360001  
(916) 653-5791



**JUN 22 2010**

TO: Distribution List

Attached is the fourth report to the Chairs of the Senate and Assembly fiscal committees on the Department of Water Resources' (DWR) energy use and purchasing activities. This is a supplemental report required by the 2007 Budget Act (Item 3860-001-0001), dated August 2007.

The report discusses the energy related activities of DWR's State Water Project, the California Energy Resources Scheduling Division, and the Office of Water Use Efficiency and Transfers related to its statutory and regulatory authority and disbursement of bond funds.

If you have any questions, please contact me at (916) 653-7007 or your staff may contact Veronica Hicks, Chief of DWR's State Water Project Power and Risk Office at (916) 574-1295.

Sincerely,

A handwritten signature in black ink, appearing to read "Mark W. Cowin".

Mark W. Cowin  
Director

Attachments

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Sacramento, California 95814

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**The California Department of Water Resources Summary Report to the  
California State Legislature Regarding its  
Energy Use and Purchasing Activities, ~~July 1, 2009~~**

*June 1,  
2009*

This report articulates the Department of Water Resources' (DWR's) annual energy consumption and related reductions in greenhouse gases as required by the Budget Act of 2007,<sup>1</sup> and consistent with Assembly Bill (AB) 1585.<sup>2</sup>

- Carbon dioxide (CO<sub>2</sub>) emission levels from State Water Project (SWP) operations will meet the California AB 32 goal of reducing greenhouse gas (GHG) emissions to 1990 levels 12 years earlier than the 2020 deadline.
- DWR's coal based energy contract with Nevada Power Company expires on July 25, 2013. DWR will replace this energy source with resources that reduce the emissions associated with the SWP's power purchase portfolio.
- DWR is preparing a request for bids for renewable energy for the SWP, and enter into partnerships with public agencies to solicit renewable energy.
- From 2003 through 2011, DWR's hydroelectric energy efficiency programs (refurbishing or replacing units at SWP facilities) will save 932,000 megawatt hours, and 0.26 million metric tonnes of CO<sub>2</sub> emissions.
- In March 2008, DWR submitted its CO<sub>2</sub> emissions inventory report for 2007 to the California Climate Action Registry (CCAR). DWR was awarded status of Climate Action Leader in May 2009.<sup>3</sup>
- DWR sponsors the Subsidence Mitigation Rice Cultivation Research and Farm Scale Wetlands Demonstration Projects<sup>4</sup> within the Western Delta.
- DWR has applied for certification of its New Science Center, and the Pearblossom Administration Building through the Leadership in Energy and Environmental Design Silver Standard.<sup>5</sup>
- DWR continues to collaborate with federal, State and local agencies to increase water use efficiency and thereby reduce GHG emissions related to water use. For example, in April 2009, DWR launched a committee to consider sustainability and ecosystem stewardship in its current and future activities.
- The California Energy Resource Scheduling (CERS) meets 19 percent of investor owned utilities (IOU) customers' electricity demands, with 1 percent renewable, 48 percent natural gas, and 51 percent unspecified energy.

<sup>1</sup> <[http://www.lao.ca.gov/2007/supp\\_report/supp\\_rpt\\_2007.pdf](http://www.lao.ca.gov/2007/supp_report/supp_rpt_2007.pdf)>

<sup>2</sup> <[http://www.leginfo.ca.gov/pub/09-10/bill/asm/ab\\_1551-1600/ab\\_1585\\_bill\\_20100226\\_chaptered.pdf](http://www.leginfo.ca.gov/pub/09-10/bill/asm/ab_1551-1600/ab_1585_bill_20100226_chaptered.pdf)>

<sup>3</sup> <<http://www.water.ca.gov/>>

<sup>4</sup> <<http://www.water.ca.gov/deltainit/docs/Interim-Delta-Actions.pdf>>

<sup>5</sup> <<http://www.greenbuildings.dgs.ca.gov/default.asp>>





**The California Department of Water Resources  
Report to the California State Legislature  
Regarding its Energy Use and Purchasing Activities**

**July 1, 2009**

*June*

The Department of Water Resources (DWR) is pleased to submit its semiannual Report to the Legislature (fourth in the series) summarizing its energy use and purchasing activities. This report addresses the actions DWR is taking to:

- Phase out the use of coal-based energy supplied from its participation agreement for the partial output of Reid Gardner Plant Unit No. 4, and to replace it with other less carbon-intensive energy resources;
- Reduce fossil fuel use and increase energy efficiency in State Water Project (SWP) operations;
- Reduce energy and water consumption through DWR's statutory and regulatory authority and through disbursement of bond funds; and
- Reduce fossil fuel use in its California Energy Resources Scheduling (CERS) Division contracts and to replace that fuel with less polluting energy resources.

Hydropower meets the definition of a renewable energy resource since it is produced by converting resources that are non-depletable or naturally replenishable to electricity.<sup>1</sup> The California Renewables Portfolio Standard (RPS) limits the size of hydroelectric power that qualifies under its RPS to 30 MW capacity, since large hydroelectric generation already represents a technologically mature and fully commercialized industry.<sup>2</sup>

Over the last 18 years, the SWP has generated enough clean emissions hydroelectric power to meet 40 percent to 60 percent of its energy resource needs annually, depending on annual precipitation and water demands. In addition to generating its own hydroelectric power, DWR has implemented hydroelectric energy efficiency programs, which contribute substantially to savings in pumpload requirements and to increased hydrogeneration capacity.

<sup>1</sup> <<http://www.oas.org/dsd/publications/Unit/oea79e/ch05.htm>>

<sup>2</sup> <<http://www.awea.org/policy/rpsmechste.html>>





## Executive Summary

This report is an update on DWR's energy related activities. In summary:

- Carbon dioxide (CO<sub>2</sub>) emission levels from SWP operations will meet the California Assembly Bill (AB) 32 goal of reducing greenhouse gas (GHG) emissions to 1990 levels well in advance of the 2020 deadline (12 years early).
- DWR's contract for energy from Reid Gardner expires in 2013. DWR will replace this energy with cleaner resources, significantly reducing the SWP's emissions.
- DWR's bid for renewable energy acquisitions for the SWP and partnerships with public agencies to solicit renewable energy is in the final stages of review.
- In 2007 and 2008, DWR's participation in California's Demand Response Program resulted in a 3,900 ton reduction of CO<sub>2</sub> emissions. The program reduces the need for the least efficient on-peak thermal generation.<sup>3</sup>
- Through 2011, by refurbishing or replacing hydroelectric units at SWP facilities, the SWP's energy efficiency programs will save 932,000 megawatt hours (MWh), and 260,000 metric tons (MT) of CO<sub>2</sub> emissions.



In March 2008, DWR submitted its CO<sub>2</sub> emissions inventory report for 2007 to the California Climate Action Registry (CCAR). DWR was awarded status of Climate Action Leader in May 2009.<sup>4</sup>

- To determine the rate of land accretion and the potential for carbon sequestration for farming within the Western Delta, DWR is sponsoring Subsidence Mitigation Rice Cultivation Research and Farm Scale Wetlands Demonstration Projects.<sup>5</sup>
- DWR is applying the Leadership in Energy and Environmental Design (LEED) Gold Standard in its design and construction of a new SWP Area Control Center located in the SWP's Southern Field Division.
- DWR continues to collaborate with federal and State agencies to increase water use efficiency and thereby reduce GHG emissions related to water use.
- In April 2009, DWR launched a committee to consider sustainability and ecosystem stewardship in its current and future activities.

<sup>3</sup> Emissions are estimated using the WECC California CO<sub>2</sub> Output Emission Rate published in the U.S. EPA Emissions and Generation Resource Integrated Database (eGRID).

<sup>4</sup> <<http://www.water.ca.gov/>>

<sup>5</sup> <<http://www.water.ca.gov/deltainit/docs/Interim-Delta-Actions.pdf>>



- CERS meets 19 percent of investor owned utilities (IOU) customers' electricity demands, with 1 percent renewable, 48 percent natural gas, and 51 percent unspecified energy.

## **The Department of Water Resources Operations Update**

DWR is an agency of the State of California, headquartered in Sacramento, responsible for monitoring, conserving, and developing California's water resources, providing public safety, and preventing property damage related to water resources. DWR's mission mandates that all projects undertaken shall benefit the State's people, and to protect, restore, and enhance natural ecosystems and human environments.

DWR policies to implement effective measures to address climate change and reduce GHG emissions associated with California's water management objectives are evolving as DWR gains insight and experience with its ongoing programs and pilot projects. DWR's strategy in managing the SWP incorporates these objectives within the context of meeting its regulatory, hydrologic, and environmental responsibilities.

California faces severe water supply problems across the State. Continuing dry conditions and Delta pumping restrictions to protect fish are limiting 2009 water deliveries. DWR's final snow survey of the season, performed April 30, 2009,<sup>6</sup> indicates snowpack water content is 66 percent of normal for the date, statewide. Last year at this time, snowpack was measured at 72 percent of normal, statewide. Following upon two consecutive dry years, these deficiencies exacerbate already low carryover storage levels in California's major reservoirs.

In October 2008, DWR's initial allocation for water delivery requests to the SWP contractors for 2009 was 15 percent,<sup>7</sup> the second lowest in the SWP's history. As the water year developed, the allocations were gradually increased. On May 20, 2009, the final allocation was announced at 40 percent of contractors' requests.<sup>8</sup>

In February 2009, Governor Schwarzenegger declared a drought state of emergency,<sup>9</sup> directing DWR and other state agencies to provide assistance to people and communities impacted by the drought. On March 30, 2009, DWR provided the Governor an update on drought conditions and recommended strategies.<sup>10</sup> DWR holds public workshops to provide updates on drought impacts and response activities.<sup>11</sup>

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<sup>6</sup> <<http://cdec.water.ca.gov/cgi-progs/products/040209fourthresults.pdf>>

<sup>7</sup> <<http://www.water.ca.gov/swpao/docs/notices/08-07.pdf>>

<sup>8</sup> <<http://www.water.ca.gov/swpao/docs/notices/09-07.pdf>>

<sup>9</sup> <<http://www.gov.ca.gov/proclamation/11557/>>

<sup>10</sup> <<http://www.water.ca.gov/news/newsreleases/2009/040209drought rpt-gov.pdf>>

<sup>11</sup> <<http://www.water.ca.gov/drought/conditions/index.cfm>>





In March 2009, the Climate Action Team (CAT), tasked to produce biennial science assessments on climate change and California, released its Draft Biennial Report. The report suggests that without action, severe climate change impacts are possible for the state's vulnerable water supplies, as well as for agriculture, forestry, energy, water and health, and problems related to sea-level rise.<sup>12</sup> The CAT report synthesizes research by scientists from prominent universities and research institutions. The final report will be released in late summer 2009.<sup>13</sup> DWR is an active member of the CAT team.

Sustainability<sup>14</sup> of natural resources may be the defining issue of 21<sup>st</sup> Century. It is the policy of DWR to become a sustainability leader and ecosystem steward within State government and the California water community by promoting, advocating, and facilitating sustainability practices throughout its business operations and the SWP. DWR is developing guidelines for implementing its new Sustainability Policy, informed by industry best practices. DWR will formalize the guidelines by April 2010.

### **The California State Water Project**

The SWP is the largest State-owned, multipurpose water project in the country and its operations are critical to the resources and economy of California. The SWP's system spans nearly the entire State, from Lake Oroville in Northern California to Pyramid, Castaic, Silverwood and Perris reservoirs in Southern California. The SWP delivers an average of 3.3 million acre-feet (AF) of water per year to 29 public agency water contractors throughout California. These deliveries serve the water needs for over 24 million Californians and irrigate 750,000 acres of farmland.

The SWP is the third largest generator of clean hydropower in California. Its water conveyance system includes 33 water storage facilities, 700 miles of canals and pipe lines, 20 pumping plants, 4 pumping-generating plants and 5 hydroelectric power plants. The SWP also acquires energy from an off-aqueduct hydroelectric power plant, and imports thermal energy from Nevada. The SWP's generation sources exceed 1,900 MW capacity. On average, the SWP generates five billion kilowatt-hours (kWh) of clean hydroelectric energy each year. The SWP's hydroelectric pumping facilities represent approximately 2,600 MW of capacity.

#### *The State Water Project Energy Portfolio Recent Statistics – 2007 and 2008*

Bulletin 132, *Management of the California State Water Project*, is a series of annual reports that describe the status of SWP operations and water deliveries. Each annual report updates information regarding project costs and financing, water supply planning, power operations, significant events that affect the management of the SWP, hydrologic

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<sup>12</sup> <<http://www.energy.ca.gov/2009publications/CAT-1000-2009-003/CAT-1000-2009-003-D.PDF>>

<sup>13</sup> <<http://www.climatechange.ca.gov/publications/cat/>>

<sup>14</sup> The *California Water Plan Update 2005* defines "sustainability" as "a specific resource that avoids complete depletion over a specified time horizon" and "the continued feasibility of a specified economic activity over a specified time horizon, usually influenced by management and policy actions."





information for the water year, fiscal year capital construction information, and water delivery, operations, maintenance, and other activities.

Bulletins 132-08 and 132-09, which reflect SWP operations in calendar years 2007 and 2008 respectively, will be published in 2010 and 2011. Table 1 summarizes the SWP's energy portfolio draft data for 2007 and preliminary data for 2008. This data illustrates the profound impact of regulatory, environmental, and hydrologic conditions, which have reduced water deliveries and the associated energy resources of the SWP over the course of the last two years.

**Table 1. SWP 2007 and 2008 Energy Portfolios**

<b>SWP Annual Energy Portfolio</b>		
<b>Calendar Year</b>	<b>2007</b>	<b>2008</b>
<b>SWP Water Deliveries (Million Acre-Feet)</b>	2.77	1.70
<b>SWP Generation Resources (Gigawatt Hours)</b>		
Oroville (Hyatt-Thermalito)	2,221	1,010
Gianelli	262	155
Warne	467	316
Devil Canyon	1,175	690
Castaic	793	512
Alamo	59	67
Mojave Siphon	79	44
Pine Flat	195	203
Small Hydro	<u>145</u>	<u>139</u>
<b>SWP Hydrogeneration</b>	<b>5,396</b>	<b>3,136</b>
Exchange Agreements	326	161
Market Purchases	<u>4,776</u>	<u>3,706</u>
<b>Purchases &amp; Exchanges</b>	<b>5,102</b>	<b>3,867</b>
Reid Gardner Unit #4	<u>1,387</u>	<u>1,134</u>
<b>Non-Hydro Imports</b>	<b>1,387</b>	<b>1,134</b>
<b>SWP Total Generation Resources</b>	<b>11,885</b>	<b>8,137</b>
<b>SWP Sales and Exchanges (Gigawatt Hours)</b>		
Exchange Out Agreements	182	83
Market Sales	<u>2,069</u>	<u>2,249</u>
<b>Sales &amp; Exchanges</b>	<b>2,251</b>	<b>2,332</b>
<b>SWP Net Generation Resources</b>	<b>9,634</b>	<b>5,805</b>

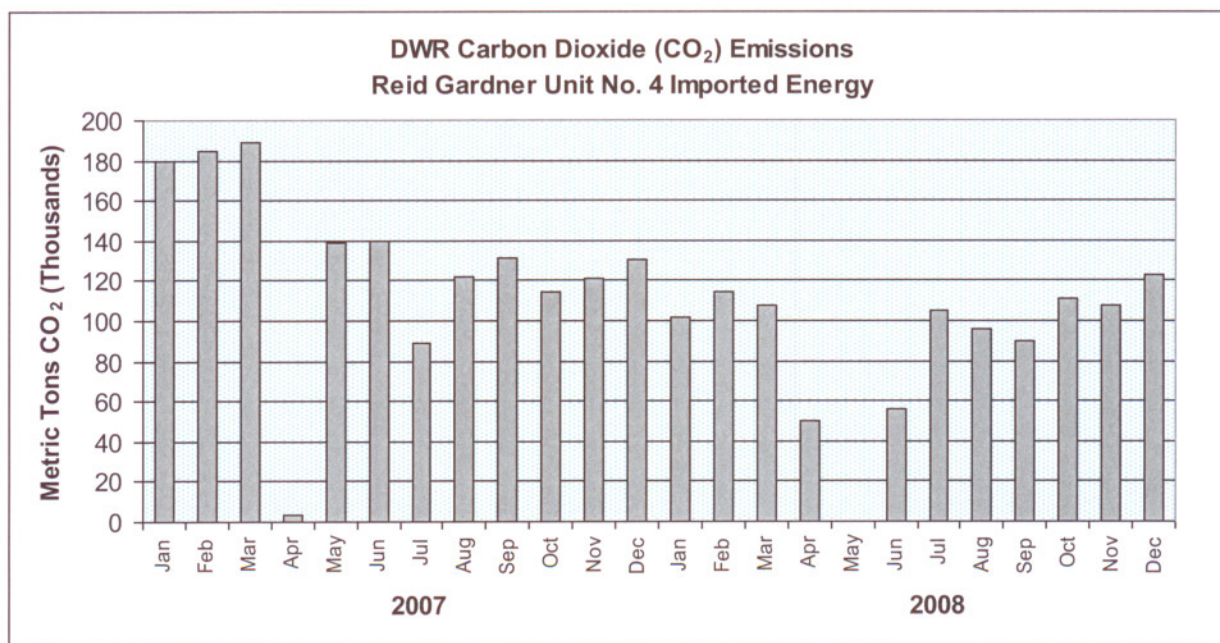


### Phasing Out Reid Gardner Plant – Acquiring Less Carbon-Intensive Energy

The electric power needed to operate the SWP comes from its own and jointly developed hydroelectric facilities, long- and short-term purchase agreements, and a 30 year agreement with Nevada Power Company. Since July 25, 1983, DWR has received up to 235 MW from one of four units at the Reid Gardner coal-fired generation facility located in Moapa, Nevada. In May 2007, DWR formally notified the plant's owner that DWR will not renew this agreement, which expires on July 25, 2013. DWR intends to replace this coal based energy with a combination of cleaner, more efficient resources, improvements to the SWP system, and renewable energy resources.

For 2007 through 2008, CO<sub>2</sub> emissions measured at Reid Gardner Unit No. 4, disaggregated on a monthly basis, are shown in Figure 1. The drop in emissions for April 2007 and May 2008 are due to the plant being taken off-line to perform maintenance and plant improvements.

**Figure 1. CO<sub>2</sub> Emissions from SWP Energy  
Received from Reid Gardner Unit No. 4 in 2007 and 2008**



Based upon the data in Table 1, estimates for the CO<sub>2</sub> emissions for the 2007 SWP portfolio are summarized in Table 2. Consistent with the CCAR protocols, hydroelectric, nuclear, and renewable energy resources are assigned zero carbon emissions factors. Reid Gardner Unit No. 4 CO<sub>2</sub> emissions data was retrieved from the U.S. Department of Energy (DOE) Environmental Protection Agency's (EPA) *Clean Air Markets Database*





(CAMD).<sup>15</sup> Emissions for the SWP's purchases and exchanges from unspecified sources are estimated using CCAR 2007 emissions rates reported by its members,<sup>16</sup> direct reporting by counterparties to DWR on their specific emissions rates, and CCAR recommended regional default factors derived from the U.S. DOE EPA<sup>17</sup> *Emissions & Generation Resource Integrated Database* (eGRID).

The SWP Power Purchase Portfolio MWh and metric tons of carbon dioxide represents gross emissions levels. However, when SWP power purchases exceed the energy required to serve the SWP's pumpload, DWR sells its surplus energy. SWP sales transactions are not tied to specific generation resources, other than under its Demand Response program where specified pumpload is interrupted. The SWP emissions rate is calculated using the SWP's total estimated metric tons CO<sub>2</sub> divided by MWh from all SWP generation sources. This derived rate yields a net emissions level as shown below.

In 2008, the SWP's gross CO<sub>2</sub> emissions decreased from 2007 by 27 percent, consistent with diminished water deliveries, drought conditions, and regulatory constraints. When sales and exchanges out are taken into consideration, the reduction in 2008 emissions equals 34 percent.

**Table 2. SWP Energy Portfolio CO<sub>2</sub> Emissions in 2007 and 2008**

<b>State Water Project CO<sub>2</sub> Emissions</b>			
<b>Source</b>	<b>2007 Emissions (MMT CO<sub>2</sub>)</b>	<b>2008 Emissions (MMT CO<sub>2</sub>)</b>	<b>% Change</b>
Reid Gardner Unit No. 4	1.4	0.96	-31%
Market Purchases & Exchanges In	1.82	1.39	-24%
<b>Gross Emissions</b>	<b>3.22</b>	<b>2.35</b>	<b>-27%</b>
Market Sales & Exchanges Out	0.61	0.63	3%
<b>Net Emissions</b>	<b>2.61</b>	<b>1.72</b>	<b>-34%</b>

#### Efficient Energy Technology - Non-Renewable Resources Generation

CO<sub>2</sub> emissions from electric power generation are influenced by the efficiency factors associated with converting fossil fuels into electricity, as well as the type of fuel used. Emissions factors associated with coal-fired generation are almost twice that of natural

<sup>15</sup> <<http://camddataandmaps.epa.gov/gdm/>>

<sup>16</sup> <<http://www.climateregistry.org/CARROT/public/reports.aspx>>

<sup>17</sup> Emissions & Generation Resource Integrated Database (eGRID) provides information on the air quality attributes of almost all the electric power generated in the United States. eGRID2006 Version 2.1, April 2007 (year 2004 data), <<http://www.epa.gov/cleanenergy/energy-resources/egrid/index.html>>





gas powered generation. In a typical power plant, only 30 percent of the energy is actually converted into electricity. Improvements in generation efficiency by replacing traditional power generators with more efficient technologies can result in lower CO<sub>2</sub> emissions. Consequently, DWR is investigating ownership interest and contractual agreements in technologies such as combined-cycle generation. Energy from combined cycle gas turbines is rated for emissions that average 800 pounds CO<sub>2</sub> per MWh. The first phase of investigations is complete. Final studies include obtaining a plant license from the California Energy Commission for a new state-of-the-art combined-cycle gas plant.

### State Water Project System Enhancements - New Small Hydroelectric Generation Capacity

Generation from a small hydroelectric facility that commences commercial operations or is repowered on or after January 1, 2006 is eligible for the California Renewable Portfolio Standard (RPS), if the facility meets all of the following criteria:<sup>18</sup>

- The facility is 30 MW or less, with an exception for eligible efficiency improvements made after January 1, 2008, as discussed below.
- The facility is located in-State or satisfies the out-of-state requirements.
- The facility does not "cause an adverse impact on instream beneficial uses or cause a change in the volume or timing of streamflow."<sup>19</sup>

DWR entered into Phase II of its East Branch Enlargement Project, including conducting further engineering investigations into the viability of adding a new small hydroelectric generator at the SWP Alamo Power Plant. The new unit would add 14 MW capacity of small hydrogeneration, which qualifies under California's RPS, and will further reduce the SWP's carbon footprint. Through 2011, DWR will continue its environmental and right-of-way acquisition efforts for this project, as well as develop and refine the unit's design and performance specifications. Final design is expected to be completed in September 2015.

### Energy Efficiency Improvements

In 2006, DWR completed the construction of a new reservoir known as the Tehachapi East Afterbay. The Afterbay provides water storage for the SWP's "Valley String" (Dos Amigos, Buena Vista, Teerink, Chrisman, and Edmonston pumping plants). The facility consists of a 910 AF reservoir, inlet channel, outlet channel, bypass, and appurtenant structures.

The new reservoir enables DWR to reduce pumping operations of the Valley String plants during peak energy demand periods, and to provide reliability services to the

<sup>18</sup> <<http://www.energy.ca.gov/2007publications/CEC-300-2007-006/CEC-300-2007-006-ED3-CMF.pdf>>

<sup>19</sup> Public Utilities Code Section 399.12(c)(1)(A).





California electrical grid. The Afterbay provides additional storage capacity by allowing a seasonal reduction in on-peak load, which simultaneously reduces market reliance on poorer quality thermal units that emit higher amounts of GHGs during peak energy demand periods.

DWR is continuing feasibility studies for using renewable technologies such as small hydroelectric, wind energy, and solar projects within its system.

### Reducing Fossil Fuel Use and Increasing Energy Efficiency in SWP Operations

The SWP's hydroelectric power generation allows for reduced reliance on thermal generation. Consistent with the spirit of AB 32 and DWR's mission to enhance California's natural and human environments, DWR conducts multi-faceted engineering studies and programs to improve water-to-energy conversion of all SWP equipment and facilities. DWR's improvement programs include pump and turbine replacements and refurbishments, to ensure that the SWP's hydroelectric units perform at the highest levels of energy efficiency. Major energy efficiency projects have been undertaken at the A.D. Edmonston Pumping and the Edward Hyatt Power plants, resulting in state-of-the-art performance levels exceeding 90 percent efficiency.

In the last report, DWR updated its calculations for the CO<sub>2</sub> emissions reductions associated with the SWP Energy Efficiency programs at Hyatt and Edmonston from 2003 through 2020 using the weighted average of its 2007 emissions rates associated with power purchases and exchanges.

**Table 3. SWP Energy Efficiency Savings and Resulting CO<sub>2</sub> Emissions Reductions Years 2003 – 2020**

Energy Efficiency Program	Cumulative Energy Savings (megawatt hours)		Cumulative Emissions Reductions (metric tons CO <sub>2</sub> )		Equivalent Emissions Savings
Years	Hyatt Generation	Edmonston Pumping	Hyatt Generation	Edmonston Pumping	Automobile Equivalents
2003-2007	306,949	5,951	117,753	2,283	21,985
<u>2008-2020</u>	<u>1,721,443</u>	<u>763,000</u>	<u>660,386</u>	<u>175,297</u>	<u>174,559</u>
<b>Total by Plant</b>	<b>2,028,392</b>	<b>768,951</b>	<b>778,139</b>	<b>177,580</b>	<b>196,543</b>
<b>CUMULATIVE TOTAL</b>	<b>2,797 million megawatt hours</b>		<b>0.95 million metric tons CO<sub>2</sub></b>		<b>196,543 autos</b>

Under Phase II of the East Branch Enlargement program, DWR is studying the feasibility of adding two new pumps at the Pearblossom Pumping Plant. Each new pump would provide 22 MW additional pumping capacity.

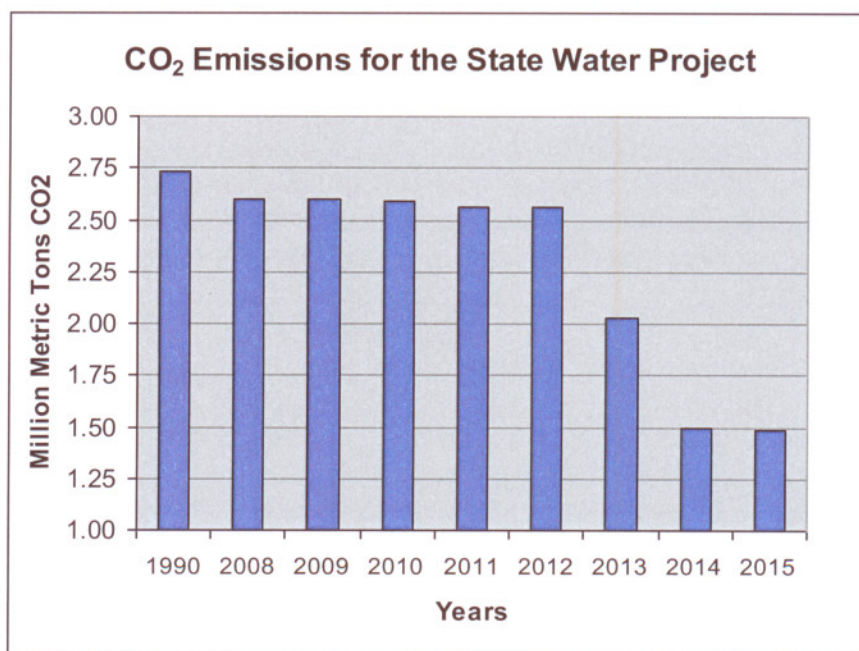


The new unit installations are expected to increase energy efficiency by approximately 0.5 percent per pump, and reduce DWR's carbon footprint, since this installation results in less energy required to pump water. The new units will be installed by the close of 2017.

#### Forecast of SWP Emission Reductions

DWR forecasts a reduction in SWP CO<sub>2</sub> emissions by: (1) replacing its coal based energy with resources that generate lower emissions, (2) increasing its hydrogeneration through energy efficiency projects, and (3) increasing the level of renewable energy resources in its portfolio. As a result of the energy efficiency programs and future power purchases enumerated in the paragraphs above, DWR expects to reduce emission levels associated with 2008 SWP operations by over one MMT of CO<sub>2</sub> by 2015. This forecast reduction is calculated using parameters associated with the most recent power purchases and sales transactions to a 10-year average hydroelectric generation and pumpload, to account for fluctuating hydrologic conditions from year to year. Forecast CO<sub>2</sub> reductions through the year 2015 are illustrated in Figure 2.

**Figure 2. SWP Incremental Forecast CO<sub>2</sub> Emissions Reductions**







### Reducing Fossil Fuel Use and Increasing Energy Efficiency in SWP Facilities

The U.S. Green Building Council (USGBC) is a 501(c)(3) nonprofit community of leaders that have developed a recognized standard for green building and development. USGBC's LEED Green Building Rating System promotes reliable building design and performance measurement systems.<sup>20</sup> LEED certification provides independent, third-party verification that a building project meets the highest green building and performance measures.

LEED provides a complete framework for meeting sustainability goals and assessing building performance in six categories: Sustainable Sites; Water Efficiency; Energy and Atmosphere; Materials and Resources; Indoor Environmental Quality; and Innovation and Design Process. LEED certification assigns progressive levels (Certified, Silver, Gold and Platinum) that can be achieved based on the number of points awarded to a building project.

DWR plans to design and construct its new SWP Southern Field Division Area Control Center to meet the requirements for LEED's Gold certification program. As a result, this new facility will:

- Lower operating costs
- Reduce waste sent to landfills
- Conserve energy and water
- Reduce GHG emissions
- Demonstrate DWR's commitment to environmental stewardship and social responsibility

DWR is currently engaged in the design review phase of the Project with final design expected to be completed by July 2009 and construction completed in October 2010.

### **Reducing Energy Use and Water Consumption – DWR's Water Use Efficiency Programs**

The Governor has identified conservation as one of the key ways to provide water for Californians and protect and improve the Delta ecosystem. He has directed State agencies to develop and implement a more aggressive plan to help achieve a 20 percent reduction in per capita water use statewide by 2020. This directive builds upon the *California Water Plan Update 2005*, which identified water use efficiency as a "foundational action" for California water management.

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<sup>20</sup> <[http://www.usgbc.org/Docs/LEEDdocs/LEED\\_RS\\_v2-1.pdf](http://www.usgbc.org/Docs/LEEDdocs/LEED_RS_v2-1.pdf)>





To implement this goal, DWR is collaborating with the California Energy Commission, the California Public Utilities Commission, the State Water Resources Control Board, and the Department of Public Health to develop and implement various measures and strategies to increase water use efficiency and thereby reduce GHG emissions related to water use. To support this implementation, this conservation initiative will need to utilize the many Integrated Regional Water Management (IRWM) planning efforts throughout California. During 2008, the five-agency group has been developing information that will form the basis of recommendations to the Governor in 2009 and will be incorporated into the 2009 California Water Plan Update.

Based on urban water use of about 8.7 MAF per year, attainment of the Governor's target will result in conservation of about 1.76 MAF per year by 2020. This savings will likely be achieved through a combination of more widespread implementation of best management practices for urban water conservation, programs currently under development by State agencies and others, application of State law, and the implementation of new programs not yet developed.

DWR is also working to improve agricultural water management and planning tools such as the California Irrigation Management Information System (CIMIS). DWR expects to develop additional agricultural water conservation programs consistent with its urban conservation target set by the Governor.

The primary benefit of improving water use efficiency is to increase supply reliability by lowering demand and cost-effectively stretching existing water supplies. Another important benefit of improving water use efficiency is based on the relationship between GHG emissions and the use of fossil fuels. This relationship is key to the reduction of GHG emissions through water use efficiency because approximately 19 percent of all electricity and 30 percent of natural gas (non-power plant) are used to convey, treat, distribute, and use water.

Selected programs that are proposed, under development, or in progress to increase conservation include:

- *Best Management Practices (BMPs)* - Promote greater urban water conservation:
  - a. Implement Chapter 628, Statutes of 2007, AB 1420, which requires DWR, in consultation with the SWRCB and California Bay-Delta Authority, to develop eligibility requirements urban water suppliers to implement demand management measures (DMM) described in urban water management plans in order to be eligible for specified water management grants and loans. This statute requires DWR to convene an independent panel to provide recommendations to the Legislature on new DMM (conservation) measures, technologies and approaches. This statute also requires DWR to prepare a report to the Legislature that identifies water conservation measures that achieve water savings significantly above DWR conservation levels.



- b. Use incentives (such as access to funding) to promote greater implementation of BMPs; and
  - c. Use regulatory tools to ensure greater implementation of BMPs.
- *Appliance Efficiency Standards* - The California Energy Commission will establish and update appliance efficiency standards to conserve water and energy:
  - d. Establish efficiency standards for irrigation controllers and spray devices;
  - e. Conduct research and demonstration projects that reduce the energy intensity of the water recycling process and improves overall quality;
  - f. Establish water conservation and efficiency standards for both buildings and appliances that save both water and energy; and
  - g. Conduct research and demonstration projects that explore ways to reduce the energy intensity of the water use cycle and better manage the energy demand of the water system.
- *Landscape Water Conservation* - Promote greater landscape water conservation:
  - h. Encourage a systematic approach to low impact development in order to conserve water and energy, improve water quality, reduce the production of green waste, and protect other resources; and
  - i. Establish efficiency standards for irrigation controllers and spray devices.
- *Irrigation Efficiency* - Promote greater irrigation efficiency:
  - j. Promote more widespread agricultural water management planning;
  - k. Establish efficiency standards for irrigation controllers and spray devices;
  - l. Update California's model water efficient landscape ordinance; and
  - m. Upgrade the California Irrigation Management Information System of automated weather stations.
- *Analytical Tools* - DWR proposes to develop information and analytical tools to better quantify the energy associated with each aspect of water use in each region of California in order to prioritize water use efficiency efforts:
  - n. Identify the energy intensity of various water end uses by region in order to prioritize the implementation of water conservation measures. This





task involves determining how much embedded energy is required to deliver water to urban end-users and to treat wastewater for multiple utilities in specific regions of the State in order to identify demand-side water-energy efficiency opportunities for the regions.

- o. Carry out research into the embedded energy required to deliver water to agricultural end users and into the sources of embedded energy in water for each region.
- p. Identify energy efficient urban and agricultural water management opportunities.
- q. Determine the marginal cost per acre-foot of urban and agricultural water by region.
- r. Develop a strategy for potential implementation that includes recycling and brackish-water desalination in areas with high water-energy intensity. Additional research will be required to determine the potential for GHG reductions and the cost effectiveness of specific recycling and brackish water desalination projects.
- s. Develop a standardized approach to evaluating how water management actions described in the *California Water Plan Update 2005* impact GHG emissions.
- t. Coordinate with the CEC and CPUC on the water-energy connection in the areas of research, planning, and project implementation activities.
- u. Refine the initial targets of GHG reduction.

### **Reducing Fossil Fuel Use in the CERS Contracts – Replacement with Less Polluting Energy Resources**

At the direction of the Governor and the Legislature DWR created the CERS Division during California's 2000-2001 energy crisis to purchase power for California's IOUs. In 2001, the CERS Division of the DWR assembled a portfolio of long-term energy contracts that achieved the directive of the Governor and Legislature to provide reliable electric service at the lowest-possible price. On behalf of the State, DWR entered into power contracts for 20 percent of the power used by IOUs. These power contracts provided the guaranteed revenue that allowed for the financing and construction of over 5,000 MW of state-of-the-art natural gas-fired power plants. These cleaner, more fuel efficient natural gas-fired power plants have significantly reduced reliance on older, less-efficient plants in the State.



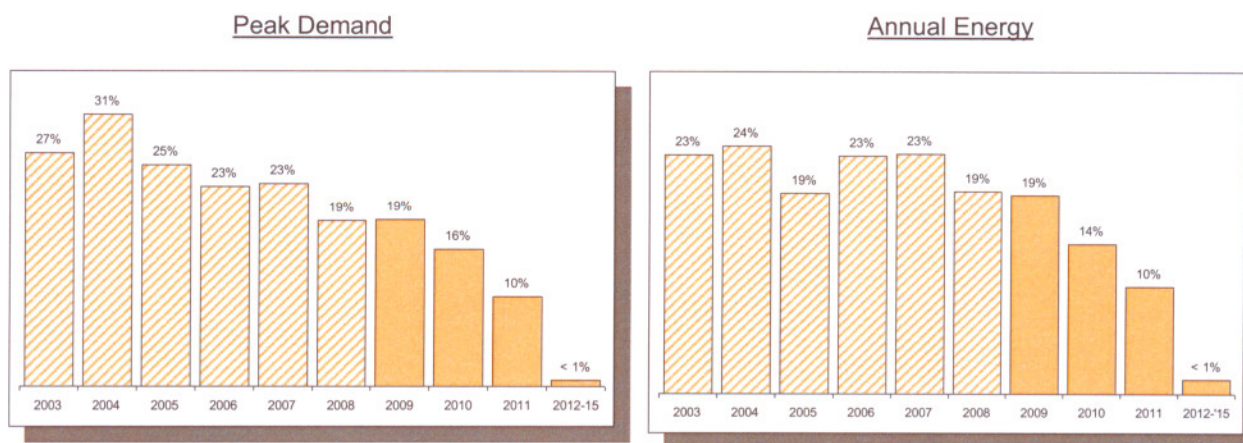
DWR originally entered into contracts with 28 counterparties to provide 56 energy products. Six of the agreements were for renewable power, and included two contracts totaling 31 MW for biomass power, one 25 MW contract for geothermal power, and three contracts for a total of 174 MW of wind power.

The contracts also provided a guaranteed source of revenue that allowed DWR's counterparties to secure financing for the construction of over 5,000 MW of new energy-efficient gas-fired power plants that were built between 2001 and 2003. These new generation plants displaced power from older, dirtier, less efficient fossil generation in 1.66 million tons annually.

The Legislature required DWR to consider a number of factors when entering into contracts for power, including intent to achieve an overall portfolio of energy contracts offering reliable service at the lowest possible price to secure as much power under contract as possible from firm and non-firm renewable energy resources. Reliable, reasonably-priced electricity is essential to the safety, health and well-being of the people of California. As opportunities for contract amendments arise, DWR strongly encourages energy portfolio options that contribute increasing percentages of renewable energy resources to its energy mix portfolio, consistent with the Legislature's intent.

Eight years after the energy crisis, DWR continues to provide electricity that will meet nearly 19 percent of the IOU customers' electricity demands in 2009. Twenty-six contracts remain in effect with an estimated cost of \$9.8 billion. By 2012, only four contracts will remain providing less than 1 percent of the IOU's customers' demand. The last contract expires in 2015, as illustrated in Figure 3.

**Figure 3. CERS Contracts as a Percent of IOU Peak Capacity & Annual Energy Demand**







### The Generation Mix of the CERS Portfolio

For 2009, the estimated mix of generation from the CERS portfolio is:

**Table 4. CERS Generation Energy Portfolio in 2009**

Source	Capacity (MW)	Energy (GWh)
Wind	100	462
Natural Gas	6,151	22,747
Non-Specific	2,713	21,135
<b>TOTAL</b>	<b>8,964</b>	<b>44,344</b>

While most of the generation in the DWR portfolio comes from newly constructed, energy efficient, natural gas-fired plants, some of the DWR contracts are with power marketers who do not own any generation, or with counterparties that have the option to provide power from market sources when it is cheaper to do so. Roughly 48 percent of the power CERS contracts are forecasted to provide in 2009 will come from non-specific market sources, which can not be traced back to a specific generator. The source of the power could be hydro, nuclear, biomass, wind, solar, natural gas, or coal or some mix of these resources. Electricity from CERS contracts with renewable energy resources will provide 1 percent of the CERS total, while electricity generated from natural gas facilities is estimated to provide 51 percent.

Between now and when the CERS contracts end in 2015, DWR will have the limited opportunity to re-negotiate the contracts to increase the amount of electricity derived from renewable energy resources.

### Role in Statewide Energy Supply

DWR's authority to enter into new contracts ended in 2002. Its temporary role in providing power limits its ability to renegotiate contracts to bring new renewable energy projects on-line. Developers of new renewable energy projects need long-term contracts in order to get financing for the projects.

For DWR to replace fossil generation in the portfolio of contracts with renewable energy, and still limit its involvement in energy markets to no longer than 2015, would require DWR to compete against the California IOUs for power from existing renewable energy projects. This would only exacerbate the problem the IOUs are currently facing in meeting the State's renewable portfolio standard goal.

Due to the unique circumstances of the CERS contracts and limitations on contract term-renegotiation, it is unlikely that fossil fuel use in the portfolio of CERS will be appreciably reduced.